

Remarks

Reconsideration is requested in view of the above amendments and the following remarks. The title is amended to be more descriptive of the pending claims.

Claim 22 is amended to incorporate limitations formerly recited in claim 24, which depended from claim 22.

Claim 22 is further amended to recite that the region adapted to be contacted by a probe needle for inspection is a dedicated inspection region, produced and used specifically to be so contacted. Applicants respectfully submit that this is implicit in both the specification and the pending claims, and that reciting this feature does not constitute the addition of new matter. Throughout the specification, the region is described as being a region set aside specifically for inspection. For example, page 5, lines 16-18 describe "a region with which a probe needle for inspection is brought into contact, other than the region in which the metal ball ... is bonded" [emphasis added]. That is, the region in question is a dedicated inspection region, deliberately created and separate from the bonding area.

In addition, Applicants respectfully submit that the feature that the region is a dedicated region does not raise new issues. Applicants note that claim 24 formerly recited that the electrode has "a portion protruded from a square that surrounds the region wherein the metal ball is bonded to the terminal electrode, the protruded portion being the region adapted to be contacted by the probe needle". That is, an additional section of the electrode is produced, distinct from the bonding portion, as a dedicated inspection region. Thus, Applicants respectfully submit that the feature that the region is a dedicated inspection region is implicit in claim 24 as filed. Applicants note that although claim 24 is canceled herein, the limitations formerly recited therein are incorporated into claim 22.

No new matter has been added. Claims 22 and 23 are pending in the application.

In the Office Action, the title is objected to as not being descriptive of the invention. The title is amended herein to "Edge Testing Electrode For A Semiconductor Device", in accordance with the Examiner's suggestion.

Claims 22 and 23 are rejected under 35 U.S.C. § 103(a) as being obvious from Masuda (JP 63-186448). Applicants respectfully traverse the rejection.

The rejection characterizes Masuda as disclosing a region adapted to be contacted by a probe needle for inspection. Applicants respectfully traverse this characterization.

Although the current Office Action does not specifically identify the alleged region, Applicants note that the Office Action mailed November 7, 2001 refers to an area on the terminal of Masuda that is not covered by the metal ball as the region. Applicants take this to be the alleged region of Masuda in the pending rejection.

With regard to claim 22, Applicants note that the area in question in Masuda is not a dedicated inspection region. Masuda nowhere discloses or even suggests that an area on the terminal that is not covered by the metal ball is a dedicated inspection region.

Indeed, Masuda clearly discloses that the region is waste space.

As noted in the translated portion of Masuda submitted with the Amendment of February 7, 2002, in the section beginning at page 1, line 3 from the bottom of the lower right column, Masuda discloses that when a metal ball 6 is compression-bonded to a quadrilateral surface, a portion "b" is left in addition to the portion to which the ball is bonded. This portion is considered "unnecessary".

As noted in the section beginning at page 3, line 9 from the bottom of the lower left column, in the invention of Masuda the metal ball may be bonded to a polygonal surface. Because the angles of such a polygon are larger than those of a rectangle, the ball fills a polygon

more efficiently than a rectangle. Thus, the wasted space, i.e. the exposed portion left over after the ball is bonded, may be reduced.

It is the purpose of Masuda to reduce the amount of space that is left after a metal ball is bonded to an electrode. This space is considered unnecessary, and is treated as something to be minimized and avoided. This is directly contrary to the principles of the claimed invention, wherein a dedicated inspection region is deliberately produced.

In addition, Applicants respectfully submit that Masuda could not even be modified to include a dedicated inspection region. Because it is the disclosed purpose of Masuda to avoid an area on the terminal that is not covered by the metal ball, or at least reduce it in size, deliberately acting counter to this purpose by attempting to dedicate a portion of that area to remain uncovered would destroy the invention of Masuda.

Furthermore, Applicants respectfully submit that an area of the terminal of Masuda that is not covered by the metal ball is not equivalent to the region adapted to be contacted by a probe needle for inspection in the claimed invention, in that it would not be adapted to be contacted by a probe needle for inspection.

The pending rejection asserts that the recitation that an element is "adapted to" perform a function only requires the ability to so perform. The rejection characterizes a portion of Masuda that is not covered by the ball 16 as being a region for a probe needle, asserting by implication that that portion of Masuda is capable of performing the function recited for the region adapted to be contacted by a probe needle for inspection in the claimed invention.

Applicants respectfully submit that Masuda lacks the ability to perform the function in question.

Masuda does not disclose or suggest any ability to perform the function of being contacted by a probe needle for inspection as this function is recited in the claims and described

by the specification. In particular, Masuda does not disclose or suggest this functionality in an area of the electrode not covered by the ball.

Applicants respectfully point out that not every open space is adapted to be contacted by a probe needle for inspection merely by virtue of being open space. Thus, the limitation in claim 22 of "a region adapted to be contacted by a probe needle for inspection brought into contact therewith" is a functional description of a definite structure, not merely a recitation that some free space of indefinite sized and configuration may be present. In order to be adapted to be contacted by a probe needle for inspection as recited in claim 22 and described in the specification, the region of the claimed invention must meet functional requirements.

For example, a minimum size sufficient to accept the tip of a physical probe needle is necessary. Conventional probe needles, for example, are on the order of several tens of μm across at their tips. Areas smaller than this size would be unsuitable for receiving the tip of a probe needle for at least the reason that the needle physically would not fit.

Even if the area surrounding the ball 16 of Masuda is open as characterized by the rejection, which point Applicants do not concede, Masuda does not positively disclose or suggest that the "open" region is suitable to be contacted by a probe needle.

Applicants respectfully submit that even if Masuda "could" be modified to provide a region adapted to be contacted by a probe needle, which point Applicants do not concede, it would not be obvious to modify Masuda in a way that is contrary to the disclosure of Masuda.

In addition, Applicant notes that Masuda does not disclose or suggest a dedicated inspection region protruded from a square that surrounds the region wherein the metal ball is bonded to the terminal electrode.

As the claimed invention according to claim 22 comprises features neither disclosed nor suggested by Masuda, and as Masuda teaches away from limitations recited in claim 22, Applicants respectfully submit that claim 22 is not obvious from Masuda.

Claim 23 depends from claim 22, and incorporates the limitations thereof. The above arguments made with regard to claim 22 apply equally to claim 23. Applicants respectfully submit that separate arguments need not be presented in support of claim 23 at this time. Applicants do not concede the correctness of the rejection with respect to these dependent claims, and reserve the right to present further arguments.

Claim 24 is rejected under 35 U.S.C. § 103(a) as being obvious from Masuda in view of Dunaway (U.S. Patent No. 5,891,745). Applicants respectfully traverse the rejection.

Claim 24 is canceled herein. However, the limitations formerly recited in claim 24 are now incorporated into claim 22, and Applicants present the following remarks with regard to Dunaway.

Dunaway is relied upon to disclose a rectangular terminal, and an electrode with a portion protruding therefrom. The rejection concedes that Dunaway does not disclose a portion protruding from a square that surrounds a region where the metal ball is bonded to the electrode, as in the claimed invention. Applicants agree.

The rejection characterizes as obvious a modification to Dunaway to form a square region around the metal ball, and to protrude a portion from that square region so as to form a rectangular terminal.

However, even if this characterization is correct, which point Applicants do not concede, Applicants respectfully submit that Dunaway and Masuda are not suitable for combination, and that even if combined they would not result in the claimed invention.

As previously noted, it is the disclosed purpose of Masuda to avoid an area on the terminal that is not covered by the metal ball, or at least reduce it in size. Combining Masuda with Dunaway so as to deliberately dedicate a portion of that area to remain uncovered would destroy the invention of Masuda. Applicants respectfully submit that modifying Masuda in a way that destroys the invention disclosed therein cannot fairly be considered to be obvious.

In addition, the alleged inspection region of Dunaway is not a dedicated test region as recited in the claimed invention according to claim 22. The bond pad 14a of Dunaway, characterized by the rejection as a protruded portion, is not dedicated to being contacted by a needle, but rather is a temporary wire bonding pad, as shown for example in Figure 4 with a wire 48 attached thereto.

Also, Applicants question whether it would in fact be obvious to adjust the relative sizes of the bond pad 14a and the bond pad 12a to produce a rectangular terminal. The primary bond pad 12a is provided as a production assembly bond pad, and the secondary bond pad 14a as a test bond pad, as disclosed for example at column 2, lines 7-11. As disclosed at column 1, lines 43-47, the primary bond pad is for permanent bonding, and the secondary bond pad is for temporary bonding.

The area of the secondary bond pad 14a in Figure 1a is relatively small, so that the bond strength is low, and a wire bonded to the secondary bond pad can be removed. Likewise, the area of the primary bond pad 12a is relatively large, so that bond strength is high, and a wire may be reliably bonded permanently thereto. However, if the secondary bond pad 14a is increased to be similar to the primary bond pad 12a, i.e. so that the whole is rectangular in shape, the bond strength to the secondary bond pad 14a increases to be similar to that of the primary bond pad 12a. Likewise, reducing the size of the primary bond pad 12a reduces its bond strength to be similar to that of the secondary bond pad 14a.

In either case, making the combined pads 12a and 14a into a rectangular shape would result in making one of them unable to fulfill their disclosed function. Thus, modifying Figure 1a to produce a rectangular shape would destroy the invention of Dunaway.

With regard to Figures 1 and 1b, Applicant notes that the secondary bond pads 14 and 14b are not protruded from the primary bond pads 12 and 12b; rather they are separated from one another by an area of insulative material.

Even if Dunaway were suitable for combination with Masuda, and could produce a rectangular shape, which points Applicants do not concede, Applicants respectfully submit that at best the combination would result in a configuration wherein a temporary wire connection region is added to the electrode of Masuda. It would not produce a semiconductor device with a dedicated inspection region adapted to be contacted by a probe needle for inspection brought into contact therewith.

As the claimed invention according to claim 22 comprises features neither disclosed nor suggested by either of Masuda and Dunaway, alone or in combination, Applicants respectfully submit that claim 22 would not be obvious from Masuda in view of Dunaway. As claim 23 depends from claim 22, and incorporates the limitations thereof, Applicants furthermore respectfully submit that claim 23 would not be obvious from Masuda in view of Dunaway for at least the same reasons.

As all matters raised in the Office Action are now addressed, Applicants respectfully request favorable reconsideration in the form of a Notice of Allowance.

S/N 09/842,487

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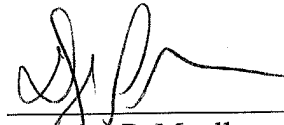
If a telephone conference would be helpful in resolving any issues concerning this communication, please contact Applicant's primary attorney-of-record, Douglas P. Mueller (Reg. No 30,300) at (612) 371-5237.



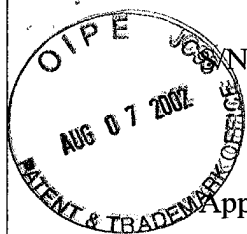
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Respectfully submitted,

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	ONO ET AL	Examiner:	J. MITCHELL
Serial No.:	09/842,487	Group Art Unit:	2822
Filed:	APRIL 25, 2001	Docket No.:	10873.447USD1
Title:	EDGE TESTING ELECTRODE FOR A SEMICONDUCTOR DEVICE (PREVIOUSLY: "SEMICONDUCTOR DEVICE")		

Amended Claim Marked To Show Changes

22. (twice amended) A semiconductor device manufactured by a wire bonding method using a metal wire, comprising a dedicated inspection region adapted to be contacted by a probe needle for inspection brought into contact therewith, and a region in which a metal ball formed at a tip of said metal wire by electric discharge is bonded to a terminal electrode formed on the semiconductor device, wherein a shape of the terminal electrode is rectangular, the shape having a portion protruded from a square that surrounds the region wherein the metal ball is bonded to the terminal electrode, the protruded portion being the dedicated inspection region adapted to be contacted by the probe needle.

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